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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,734	12/02/2003	Hideo Kaneko	0171-1045P	2079

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EXAMINER

ROSASCO, STEPHEN D

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 02/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/724,734

Applicant(s)

KANEKO ET AL.

Examiner

Stephen Rosasco

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

In response to the Amendment 12/02/05, wherein claims 7-18 were added, the examiner repeats the previous office action rejection here and makes it final.

REMARKS – The applicant argues that in the process of Bozler '894, a selected pattern is formed on the surface of a semiconductor substrate (wafer), and the pattern is made by heating selected regions of the cermet layer through exposure to radiant energy. That the process of Bozler '894 is a lithography technique that fails to disclose either transparency of the substrate or a light-shield effect of the film.

And that the substrate having the cermet layer in Bozler is not a photomask blank, as in the claimed invention because it is patterned.

And that because the manufacturing of a photomask blank does not include a patterning process, that the technical field of the present invention and the present claims differ from Bozler '894.

Claim 1-6 (original) read on a substrate with a film covering and then irradiated with a flash lamp.

It is not until new claim 7 that it is specified that the entire film must be irradiated; and new claim 9 has the first limitation as to the light transmittance. Neither of these limitations are in claims 1-6.

New claims 12-18 recite conventional lithography - cover the blank with resist and expose to form a pattern.

The examiner maintains the rejections on the grounds that, although the distinction as to the difference between a blank and a mask is true with respect to the patterning step, it is a trivial one from the standpoint of the materials and the method of exposure with a lamp.

The applicants statement that the technical fields of the claimed invention and that of the cited art are different is considered erroneous by the examiner given the claims as written. In that all patterned masks start from a blank at some initial stage of the process of making a mask. This is shown by the new claims that were added and not restricted.

The use of heat treatment for substrates to remove stresses in a bulk substrate material is well known.

Claim 1 does not limit the material of the substrate, exposure coverage of the substrate the particulars of exposure, e.g., wavelength used, duration of exposure, etc.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 6 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Bozler et al. (4,619,894).

Bozler et al. teach a process for forming a selected pattern on the surface of a substrate, comprising:

(a) forming on said substrate a substantially etchable, low ohmic resistivity cermet layer of aluminum and Al.sub.2 O.sub.3 by depositing aluminum on said substrate in an oxygen environment;

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(b) heating selected regions of said cermet layer by exposing such selected regions to radiant energy to selectively transform said exposed regions from said substantially etchable low ohmic resistivity material to substantially less-etchable material higher ohmic resistivity; and

(c) removing the unexposed regions to form a pattern of less etchable higher ohmic resistivity material on said substrate surface.

And in which said source of radiant energy is a source selected from the class consisting of electron beam, laser beam, flash lamps, ion beam and X-ray source.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (6,806,021) in view of Bozler et al. (4,619,894).

The claimed invention is directed to a method for manufacturing a photomask blank having a film of at least one layer formed on a substrate, comprising the steps of forming a film on a substrate, and irradiating the film with light from a flash lamp.

And wherein the step of forming a film on a substrate includes sputtering.

And wherein the film is a phase shift film which contains silicon, at least one metal other than silicon, and at least one element selected from the group consisting of oxygen, carbon and nitrogen.

The applicant discusses the limitations of the prior art in that phase shift masks are manufactured by lithographically patterning phase shift mask blanks, which involves the step of applying a resist onto a phase shift mask blank, irradiating selected portions of the resist with

electron beams or ultraviolet radiation, developing the resist, and etching desired portions of the phase shift film. Thereafter, the resist film is stripped, leaving a phase shift mask.

In a photomask blank like the mask blank discussed above, a film like the phase shift film is generally formed on a substrate by sputtering. Stresses are induced in the film, by which the substrate is distorted. The resulting photomask blank is thus warped. If a photomask is manufactured through patterning of such a photomask blank, the warpage of the substrate is locally resumed to the original state prior to film formation because the film is partially removed by patterning. The resulting substrate has varying degrees of flatness. These changes introduce positional shifts between the mask blank during the pattern exposure and the actually finished mask. Such positional shifts have a larger influence as the mask pattern becomes finer, and the warpage sometimes cause focal shifts.

The claimed invention is directed to providing a method for manufacturing a photomask blank of quality having minimized warpage and improved chemical resistance and a method for manufacturing a photomask therefrom.

The applicant states that they have found that by forming a film on a transparent substrate and irradiating the film with light from a flash lamp, the resulting photomask blank is minimized in warpage and the film is improved in chemical resistance. Preferably the film is formed by sputtering. The film preferably has a lower light transmittance than the substrate. Typically, the film is a phase shift film which contains silicon, at least one metal other than silicon, and at least one element selected from among oxygen, carbon and nitrogen.

Sato et al. teach a multi-layer resist process, i.e. a method wherein a resist pattern is once transcribed to a silicon oxide film to form a silicon oxide film pattern. According to this method, the silicon oxide film pattern thus formed is employed as an etching mask to dry-etch the working film, thus transcribing the pattern to the working film. As for the silicon oxide film to

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be employed in this case, there has been employed a spin-on glass which can be made into a film at a low cost by a coating method such as spin-coating without necessitating a vacuum system. However, since this spin-on glass is formed into a film by a coating method, it is difficult to obtain a film of high density as compared with the films to be obtained by a physicochemical method such as a CVD method or a sputtering method. Therefore, the film to be formed using the spin-on glass is poor in etching resistance as compared with a silicon oxide film formed by a physicochemical method, so that etch bias is most likely to be generated on the occasion of etching work of the working film.

Sato et al. also teach that a beam of flash lamp was employed as an energy beam and was applied to an intermediate film 104 functioning as a mask after a resist pattern has been formed.

The deformation or denaturing of the resist pattern 206 after the irradiation of the energy beam 207 was not recognized at all. The reason for this can be attributed to the fact that the resist pattern 206 is incapable of absorbing a light in the output wavelength zone of the flash lamp.

The teachings of Sato et al. differ from those of the applicant in that the applicant teaches the steps of forming a film on a substrate, and irradiating the film with light from a flash lamp.

Bozler et al. teach a process for forming a selected pattern on the surface of a substrate, comprising:

(a) forming on said substrate a substantially etchable, low ohmic resistivity cermet layer of aluminum and $\text{Al}_{0.2}\text{O}_{0.3}$ by depositing aluminum on said substrate in an oxygen environment;

(b) heating selected regions of said cermet layer by exposing such selected regions to radiant energy to selectively transform said exposed regions from said substantially etchable low ohmic resistivity material to substantially less-etchable material higher ohmic resistivity; and
(c) removing the unexposed regions to form a pattern of less etchable higher ohmic resistivity material on said substrate surface.

And in which said source of radiant energy is a source selected from the class consisting of electron beam, laser beam, flash lamps, ion beam and X-ray source.

It would have been obvious to one having ordinary skill in the art to take the teachings of Sato et al. and combine them with the teachings of Bozler et al. in order to make the claimed invention because it would have been obvious to one in the art to use the flash lamp method on the layers of Sato et al. because the aluminum comprising layers taught by Bozler et al. are similar.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "S. Rosasco", with a stylized initial "S" and a large, sweeping "R".

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
1/26/06